

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of)

Preparation for International)
Telecommunication Union World)
Radiocommunication Conferences)

IC Docket No. 94-31

**REPLY COMMENTS OF HUGHES SPACE AND COMMUNICATIONS COMPANY
AND HUGHES COMMUNICATIONS GALAXY, INC.**

Hughes Space and Communications Company, a unit of Hughes Aircraft Company, and Hughes Communications Galaxy, Inc. (collectively, "Hughes") submit these reply comments in response to the Notice of Inquiry ("NOI") referenced above relating to the next and future World Radiocommunication Conferences ("WRCs"). In these reply comments, Hughes discusses issues relating to mobile satellite service ("MSS") feeder links that are of particular concern to both established and planned geostationary orbit satellite ("GSO") systems using the C, Ku, and Ka bands.

I. Introduction

Over twenty parties filed comments on the Commission's NOI. The commenting parties largely represent MSS interests. Not surprisingly, given that MSS is the focal point of WRC-95 for the United States, MSS issues dominated most of the comments.

Hughes is concerned that the interests of GSO satellite systems not be brushed aside in the rush to accommodate MSS system requirements.

Hughes recognizes and understands the importance of the issues regarding allocations and regulatory aspects of MSS feeder links, and fully supports the Commission's efforts to find suitable MSS spectrum. At the same time, however, Hughes is concerned that several commenters have taken a "shotgun" approach to locating spectrum for MSS feeder links that in many instances does not take into account other important interests in the panoply of bands that they have targeted.

In particular, certain proposals for MSS feeder links impact the heavily frequency congested conventional C and Ku bands, as well as the Ka band, which is rapidly becoming subject to multiple demands. In formulating proposals for WRC-95, Hughes urges the Commission to fully consider the interests of GSO systems operating in these bands, as well as the substantial investments that satellite operators already have made in currently operating and planned GSO systems in the fixed-satellite service ("FSS") bands.

In general, Hughes agrees with the comments filed by GE American Communications, Inc. and Teledesic Corporation on the proposed allocation of certain bands for MSS feeder links. GE comments that sharing of the "conventional" C and Ku bands between non-GSO MSS feeder links and GSO satellites is not operationally feasible and correctly notes that consideration of Ka band sharing is being addressed in the recently-convened negotiated rulemaking.^{1/} Teledesic opposes consideration of the Ka band for MSS feeder links, but for two different reasons. Teledesic first argues that use of the Ka band for

1. See Comments of GE American Communications, Inc. at 3-6.

MSS feeder links would be a wasteful and inefficient use of the spectrum.^{2/} Second, Teledesic explains that there is a lack of sufficient spectrum in the increasingly congested Ka band.^{3/}

Hughes reiterates that the guiding principal for the Commission in developing U.S. proposals relating to the WRC-95 agenda should be the promotion of an internationally competitive United States satellite industry. In doing so, the Commission must take care not to promote MSS interests at the expense of other satellite interests.

II. Mobile Satellite Service

As stated in its initial comments, Hughes recognizes that it is important for the WRC to resolve the issues regarding allocations and regulatory aspects of MSS feeder links. In this regard, Hughes agrees with the view expressed by the majority of the parties commenting on the NOI that the primary focus of WRC-95 should be ensuring that adequate spectrum is allocated for MSS and its associated feeder links. However, any U.S. proposals for MSS allocations should provide for the requirements of both GSO MSS systems and non-GSO MSS systems under regulatory and technical constraints that allow equitable access for both types of systems. Proposals offered by a number of commenters would achieve this objective, while other proposals clearly would not.

2. See Comments of Teledesic Corporation at 10-11.

3. Id. at 11-13.

A. MSS Service Link Allocations

Hughes generally supports the analyses of spectrum requirements and allocation options presented in the comments of American Mobile Satellite Corporation^{4/} and Comsat Mobile Communications^{5/} for the service links between the MSS satellite and the mobile user terminals. As stated in its initial comments, Hughes supports early entry into force of the 2 GHz MSS allocations. Hughes notes that several other commenters concur with the view that these allocations should be made available much earlier than 2005.

B. MSS Feeder Link Allocations

Of all the comments and proposals relating to MSS feeder link allocations, Hughes is most concerned about those that would utilize certain Ka band frequencies. While Hughes recognizes the need for additional allocations for feeder links between the MSS satellite and gateway stations, Hughes is strongly opposed to consideration of the FSS allocations in the Ka (30/20 GHz) band for non-GSO satellites absent a clear demonstration that the Ka band can be shared by both GSO and non-GSO systems.

The FSS allocations in the Ka band are particularly unsuited for non-GSO MSS feeder link use for two reasons. The first is that the 2500 MHz of bandwidth allocated at Ka band for commercial FSS application is the only technically suitable spectrum available for new FSS systems that are capable of providing a wide variety of broadband digital services to ubiquitous very small terminals. The conventional C and Ku bands are impractical for such applications for the following reasons:

4. See Comments of American Mobile Satellite Corporation at 8-16.

5. See Comments of Comsat Mobile Communications ("CMC") at 24-31.

- The C and Ku bands are so heavily used that it is difficult or impossible to find orbital positions suitable for service to mass markets in any region of the world.
- The existing two and three degree spacing of satellites at C and Ku bands does not permit the use of very small (6 to 24 inches) aperture terminals which can be used with Ka band satellites at the same orbital spacings.
- The 500 MHz of spectrum available at a given orbital location at C or Ku band (or even the 1000 MHz available with a hybrid of C/Ku band satellite) is not sufficient to meet the anticipated spectrum requirements of new satellite services.

The second reason that the Ka band is unsuitable for non-GSO MSS feeder links is that it is becoming increasingly congested, much like the C and Ku bands.^{6/} Hughes sought authority to utilize a large portion of the Ka band spectrum (1000 MHz of Ka spectrum in each direction of transmission) for the domestic component of its global Spaceway network^{7/} and a full 2500 MHz of Ka-band spectrum in each direction for the international component of Spaceway. In addition, Teledesic Corporation has plans for a global non-GSO FSS system that would utilize 1200 MHz of Ka band spectrum,^{8/} and Norris Satellite Communications, Inc. has been authorized to construct a wideband GSO

6. "Current C and Ku-band FSS spectrum appears too congested to support future non-GSO MSS feeder link requirements...." NOI at ¶ 23 (footnote omitted). Of course, GSO MSS feeder links could be accommodated at any of the available Ka band GSO locations.

7. Application of Hughes Communication Galaxy, Inc., File Nos. 3 DSS-P/LA-95, 4 DSS-P/LA-94 (Dec. 3, 1993).

8. See Comments of Teledesic Corporation at 11-12.

system that utilizes 500 MHz of the Ka band in each direction.^{9/} These applications clearly demonstrate the magnitude of FSS requirements in what was once an uncongested band.

These proposed FSS systems will require large amounts of Ka band spectrum to support the demand that will be generated by millions of small, ubiquitous earth terminals. Thus, as is the case today at C and Ku bands, it may be difficult to accommodate in the Ka band even the feeder link spectrum requirements of Motorola and TRW.

Domestically, the problem is amplified by the proposed redesignation of the fixed service allocation at 27.5-29.5 MHz for a Local Multipoint Distribution Service ("LMDS"). As the Commission is aware, the recently-convened LMDS negotiated rulemaking is intended to develop rules to permit co-frequency, co-coverage sharing between LMDS, FSS systems, and non-GSO MSS feeder link systems.

In sum, Hughes agrees with CMC's conclusion that the Ka band is the band of "last resort" for feeder links for most non-GSO MSS providers.^{10/} Because a large number of other bands have been identified as candidates for MSS feeder links by ITU-R Task Group 4/5 and others, Hughes is strongly opposed to consideration of the FSS allocations in the Ka band for non-GSO satellites.

Hughes agrees with GE American Communications, Inc. that the "conventional" C and Ku (3.7-4.2/5.925-6.425 and 11.7-12.2/14.0-14.5 GHz) bands are too

9. In the Matter of Applications of Norris Satellite Communications, Inc., Order and Authorization, 7 FCC Rcd 4289 (1992), pet. for recon. denied, 1993 FCC Lexis 3405 (July 6, 1993).

10. CMC at 19.

congested to be suitable for sharing between non-GSO MSS and GSO FSS satellites and that such sharing would be virtually impossible without inflicting harmful interference.^{11/}

Hughes also agrees with CMC and several other commenters that there are some comparatively lightly-used FSS bands below 16 GHz that could be used for MSS feeder links either in the direction of transmission of the current allocation or with the use of "reverse-band working."^{12/} In fact, these bands offer more than sufficient spectrum for feeder links to and from the Constellation, Globalstar, and Ellipsat systems. Moreover, the applicants for these systems indicate that they prefer such bands and have designed their systems in the expectation that they will become available.

With respect to the issue of reverse-band operation, Hughes agrees that while these potential allocations are possible they must be authorized with caution and restraint. In opening bands to reverse operation for MSS, due consideration for more efficient use of that spectrum by other service providers, including GSO users, should be considered. While it is important to maintain a lead in providing MSS services, efficiency of spectral use and its reuse must be considered. As already stated by Teledesic, MSS feeder link utilization is an inherently inefficient method of spectrum utilization. The need for feeder link spectrum application can be minimized by the developments in digital technology and on-board processing, which will also reduce the requirements on double hop transmissions. These

11. See Comments of GE American Communications, Inc. at 3-5.

12. Bands below 16 GHz that are suggested for "reverse-band working" are listed in the comments of Loral/Qualcomm Partners at 5 and in the comments of Ellipsat in Exhibit A. These bands include: 4500-4800 MHz; 5000-5250 MHz; 6425-6725 MHz; 6725-7075 MHz; 10.70-10.95 GHz; 10.95-11.2 GHz; 11.2-11.45 GHz; 11.45-11.7 GHz; 12.75-13.25 GHz; and 13.75-14.0 GHz, as well as some of the congested conventional FSS bands.

technologies have been developed and are under further development by many companies. In fact, they are being readied for deployment on Spaceway and are under in orbit tests on the NASA ACTS program.

For the reasons stated above, Hughes is opposed to sharing of the conventional C and Ku bands and Ka band with non-GSO systems. In particular, with respect to any proposal to utilize Ka band frequencies for MSS feeder links, Hughes emphasizes that many emerging FSS satellite interests for that band must be taken into account.

Finally, the results of the Commission's Ka band negotiated rulemaking proceeding^{13/} must be reconciled and harmonized with the Commission's preparations for WRC-95. As urged by GE, the negotiated rulemaking should be given a fair opportunity to recommend whether sharing between MSS feeder links and FSS systems is appropriate in the Ka band, and if so, what conditions are appropriate to avoid harmful interference.

13. See FCC Public Notice of July 12, 1994, "The Federal Communications Commission Establishes a Negotiated Rulemaking Proceeding Under the Federal Advisory Committee Act for the Development of Technical Rules in CC Docket No. 92-297."

III. Conclusion

Hughes respectfully requests that the Commission consider the comments set forth above in developing United States proposals relating to issues on the agenda of WRC-95.

Respectfully submitted,

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